

THE MICROWAVE SPECTROSCOPY OF $\text{HCOO}^{13}\text{CH}_3$ IN THE SECOND TORSIONAL EXCITED STATE

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Methyl formate (HCOOCH_3) is an abundant interstellar molecule, found almost everywhere in the star-forming region. The interstellar abundance of the ^{13}C is about 1/50 of ^{12}C . The ^{13}C substituted methyl formate in the ground and first excited states were already found toward massive star-forming regions including Orion KL.^a With the aid of the state-of-the-art telescope like ALMA, the pure rotational transitions in the second torsional excited may be identified in the near future and laboratory data are necessary. We recorded the spectra of HCOOCH_3 below 340 GHz by using conventional source-modulation microwave spectrometer. The assignment of the pure rotational spectra in the second torsional excited state and the analysis by using pseudo-PAM Hamiltonian, which was effective to analyze the normal species, will be reported.

^aC. Favre, M. Carvajal, D. Field, J. K. Jørgensen, S. E. Bisschop, N. Brouillet, D. Despois, A. Baudry, I. Kleiner, E. A. Bergin, N. R. Crockett, J. L. Neill, L. Marguès, T. R. Huet, and J. Demaison, *Astrophys. J. Suppl. Ser.* **215**, 25 (2014).